Proposed Mathematical Basis For the Elliott Wave

BY RIC INGRAM

This article offers a possible mathematical foundation for the Elliott Wave theory. This proposal then is used to suggest a possible revision of the wave count for the "A,B,C" to "3,5,3," as compared with the "5,3,5" wave count given by Elliott. As may be expected, as many questions are raised as are answered.

A Pattern Emerges

A pattern began to emerge when the Elliott wave count was used to confirm the timing suggested by a cycle-based model. The classic "1,2,3,4,5,A,B,C" pattern seemed to correspond in length to one of the cycle periods identified in the time series under consideration.

The classic pattern also seemed to relate to a 4-to-1 ratio of a cycle period previously identified. That is, if the complete Elliott Wave pattern took place in, say, 4 units of time, then 1, 4, or 16 units of time often occurred as one of the cycles identified in the time series.

Moreover, these harmonics appeared in the time series when the modeling process had not previously identified these periods. In other words, Elliott Wave seemed to give a pointer to missing cycles.

Testing the Theory

To test this theory, the aggregate of two sine waves, of identical phase but with a 4-to-1 ratio for period, were plotted in a spreadsheet. The spreadsheet equation is given in Table 1.

Figure 1 illustrates the results found with the values identified above and a time resolution of 0.04. A sensitivity analysis could be conducted by altering one or more of the variables to see the impact on the pattern. (Sample spreadsheets are available from the author.)

Table 1. Spreadsheet equation used to plot the wave in Figure 1.

```
+ a1 * @SIN(2 * @PI * (t - b1) / c1 ) + a2 * @SIN(2 * @PI * (t - b2) / c2 )
```

where		*values used*
	t = time	
	a1 = amplitude (cycle 1)	1.0
	b1 = phase	1.3
	c1 = period	1.0
	a2 = amplitude (cycle 2)	2.0
	b2 = phase	1.3
	c2 = period	4.0

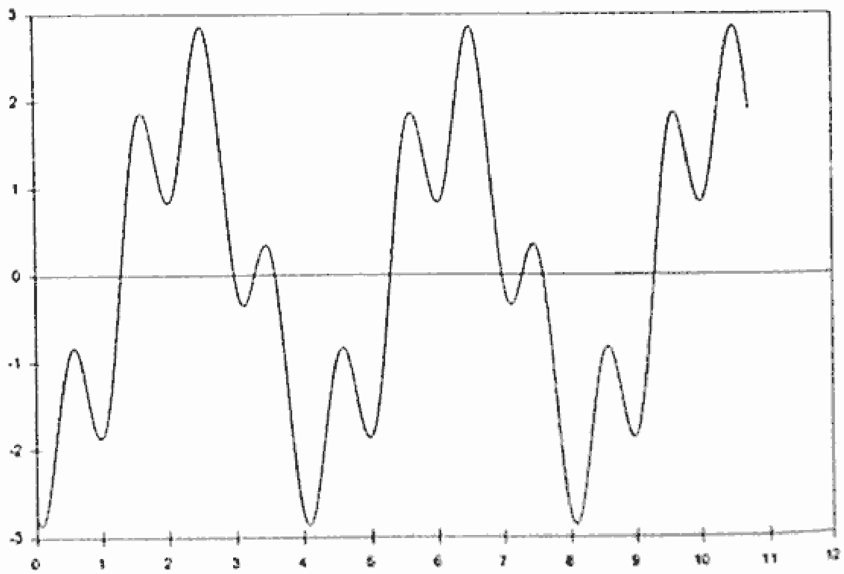

Figure 1. Two sine waves plotted with a time resolution of 0.04.

Ric Ingram is a cycle analyst using cycle and Elliott Wave techniques as a guide to trading equity markets.

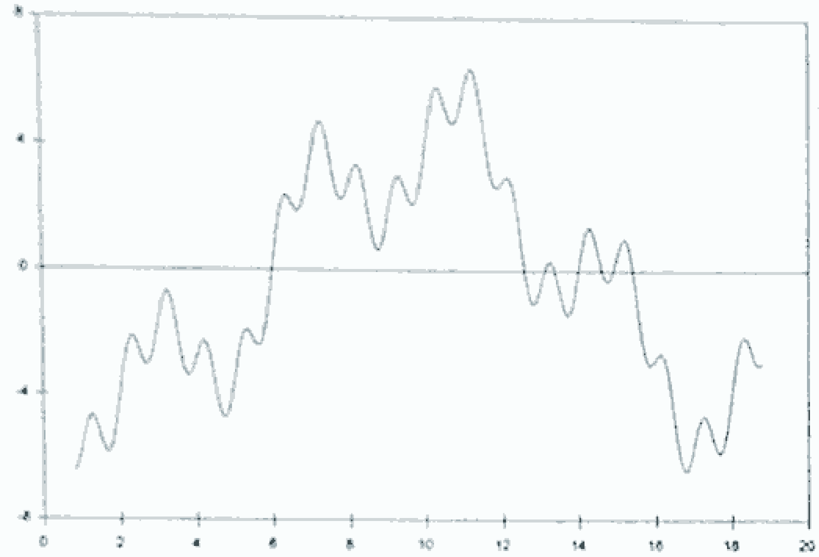

Figure 2. Three sine waves plotted with a time resolution of 0.045.

	Amplitude	Phase	Period
Cycle 1	4	-10	16
Cycle 2	2	-10	4
Cycle 3	1	-10	1

Table 1. Parameters for the three sine waves graphed in Figure 2.

Possible Interpretation

Some classic Elliott Wave relationships can be readily discerned, along with questions that may jump out at an Elliott Wave counter. Following are comments on selected Elliott Wave "features" (bold):

- **"1,2,3,4,5,A,B,C" arises in a natural manner from this simple combination of sine waves.** If this pattern represents the origin of the Elliott Wave theory, why do 4-to-1 harmonics, roughly in phase, have such "survival" value over so many other possibilities?
- **The "1" and "5" waves often are the same length, as are the "A" and "C" waves.** What phase differences are required for other relationships? What effect does an underlying growth rate have on these relationships?
- **The "3" wave is never the shortest wave.** What combination of parameters is required to give the Fibonacci ratios (such as 1.618) often seen between the length of "1" and "3" waves?
- **"A,B,C" is larger than the "2" or "4" wave.** Yes!
- **"C" waves rarely retrace to below the top of the "1" wave, and similar rules.** If a constant growth rate [(1+g/100)**t] is added to the sum of the two sine waves, what rates give us the various rules for different levels of retrenchment?

Closer inspection also may explain why "A,B,C" waves can fall faster than impulse waves rise. These three waves take less time to traverse the distance traveled by a five-wave structure. This finding reinforces the idea that component cycles (for example, sine waves), which rise as a mirror image of their rate and shape of decline, can still give rise to non-symmetrical patterns in aggregate.

Higher Levels of Elliott Cycles

Figure 2 shows the graph plotted by adding three sine waves with the parameters given in Table 2, using a time resolution of 0.045. The "3,5,3" pattern begins to be discernible in the "A,B,C."

Figure 3 shows the result of adding four sine waves with the parameters given in Table 3, using a time resolution of 0.01. The "3,5,3" pattern now can be seen in the "2" and "4" waves. The "3,5,3" structure is revealed at two levels in the "A,B,C"—the "A,B,C" itself, and within both the "A" and the "C".

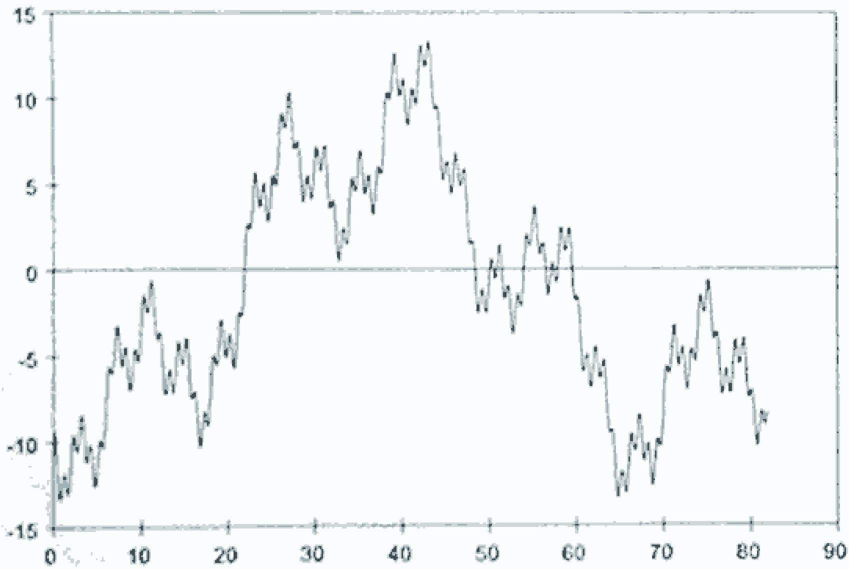

Figure 1. Four sine waves plotted with a time resolution of 0.01.

	Amplitude	Phase	Period
Cycle 1	16	22	64
Cycle 2	4	22	16
Cycle 3	2	22	4
Cycle 4	1	22	1

Table 2. Parameters for the four sine waves graphed in Figure 3.

Will this "3,5,3" wave count eliminate the need for "X" waves and other admissions of difficulty in using the Elliott "5,3,5" count for an "A,B,C"? Will the retrenchments be easier to count? Time will tell.

Conclusions

If Elliott, genius that he was, was describing no more than the sum of sine waves, it is probable that the wave count for an "A,B,C" is "3,5,3." However, this finding would just open up a new set of questions, and perhaps a small insight into the nature of growth patterns. I certainly will continue to look for more harmonics, with special regard to the 4-to-1 variety.

I think few would doubt that the Japanese Nikkei Dow has suffered a significant bear market since April 1989 (see Figure 4). This, then, should be a large enough "A,B,C" for at least two harmonics (as in Figure 3) to become clear. While one example proves little, it should cause even the most experienced Elliott waver to consider recounting his favorite bear market and "ex" a few "X" waves on the way.

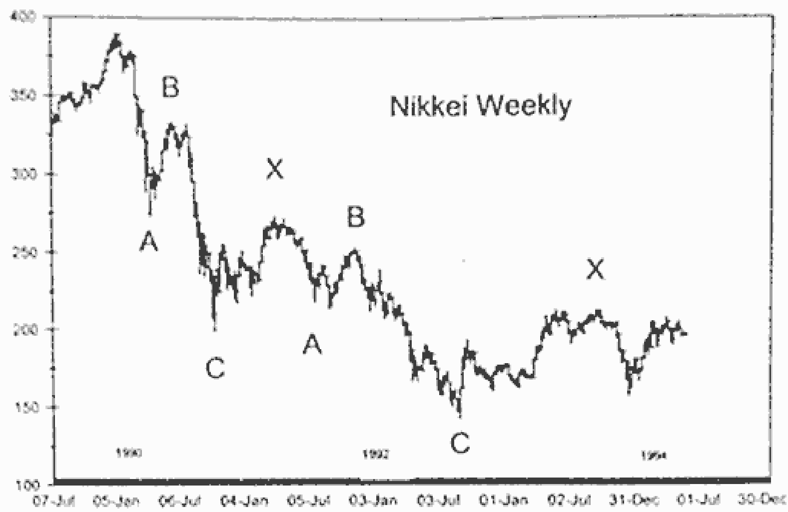

Figure 4. Weekly Nikkei since 1989.

Perhaps a cycle analyst could analyze the waves to identify their relative amplitudes at each 4-to-1 harmonic. Your comments, thoughts, and queries would be welcomed. I can be contacted through the Foundation. Good hunting.

Acknowledgments. I wish to acknowledge the contributions of Dr. George Fieldman and Dan Morris in the development of the concepts in this article. CYCLES

Submitted November 1993.